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REPORT
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AUTHORIZATION OF APPROPRIATIONS FOR THE NATIONAL BUREAU OF STANDARDS

AUGUST 13 (legislative day, AUGUST 11), 1986.—Ordered to be printed

Mr. DANFORTH, from the Committee on Commerce, Science, and Transportation, submitted the following

REPORT

[To accompany S. 2664]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 2664) to authorize appropriations to the Secretary of Commerce for the programs of the National Bureau of Standards for fiscal year 1987, and for other purposes, having considered the same, reports favorably thereon without amendment and recommends that the bill do pass.

PURPOSE OF THE BILL

S. 2664 authorizes fiscal year 1987 appropriations for the National Bureau of Standards (NBS), the Office of Productivity, Technology, and Innovation (OPTI), and the National Technical Information Service (NTIS) of the Department of Commerce.

BACKGROUND AND NEEDS

NBS was established in 1901 to develop national standards of measurement for use in scientific research, industrial manufacturing, and engineering. Standards developed by NBS are important for compatibility of products and materials, quality control, and the exchange of goods. NBS's standards and research in materials and techniques are important to the safety, productivity, and international competitiveness of many U.S. industries, especially emerging high-technology industries.

The Committee recognizes that the Nations' needs for NBS's programs change as technology evolves, as exemplified by the fact that many of NBS's areas of research, such as biotechnology, scientific

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computing, and automated manufacturing, did not exist when NBS was created. The Committee believes that responsible oversight of NBS includes the development of an authorization bill which guides NBS toward programs which address the evolving needs of science and industry.

OPTI coordinates Federal technology transfer programs and Federal patent policy, and works with State and local governments and the private sector on productivity improvement and technological development. The administration has proposed to phase out OPTI. The Committee evaluated this proposal and examined whether the elimination of OPTI will result in the termination of functions mandated by the Stevenson-Wydler Technology Innovation Act of 1980 and other acts of Congress.

NTIS is the source of Federal scientific and technical documents. NTIS is self-sufficient except for its patent licensing function.

Legislative History

On April 10, 1986, the Subcommittee on Science, Technology, and Space held a hearing on fiscal year 1987 funding for NBS, OPTI, and NTIS. Witnesses at the hearing included the Director of NBS, the Assistant Secretary of Commerce for Productivity, Technology, and Innovation, and the Director of NTIS.

S. 2664 was introduced by Senator Gorton on July 21, 1986. The bill was ordered reported by the Committee without amendment and without objection on July 23, 1986.

Summary of Major Provisions

Section 2(a) authorizes fiscal year 1987 appropriations for the five subactivities of NBS, as follows:

Measurement Research and Standards	$37,718,000
Materials Science and Engineering	21,882,000
Engineering Measurement and Standards	35,858,000
Computer Science and Technology	9,242,000
Research Support Activities	19,961,000

Section 2(b)(1) states that, of the funds authorized for Engineering Measurements and Standards, $3,100,000 is authorized only for the Center for Building Technology and $5,141,000 is authorized only for the Center for Fire Research.

Section 2(b)(2) states that none of the funds authorized for Research Support Activities may be used for development of a Cold Neutron Research Facility.

Section 3 authorizes $1,727,000 for OPTI.

Section 4 authorizes $500,000 for NTIS.

Estimated Costs

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, July 29, 1986.

Hon. JOHN C. DANFORTH,
Chairman, Committee on Commerce, Science, and Transportation, U.S. Senate, Dirksen Senate Office Building, Washington, DC.

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the attached cost estimate for S. 2664, the National Bureau of Standards Authorization Act for Fiscal Year 1987.

If you wish further details on this estimate, we will be pleased to provide them.

Sincerely,

RUDOLPH G. PENNER, *Director.*

CONGRESSIONAL BUDGET OFFICE—COST ESTIMATE

JULY 29, 1986.

1. Bill number: S. 2664.

2. Bill title: National Bureau of Standards Authorization Act for fiscal year 1987.

3. Bill status: As ordered reported by the Senate Committee on Commerce, Science, and Technology, July 23, 1986.

4. Bill purpose: S. 2664 authorizes the appropriation of $124.7 million in fiscal year 1987 to carry out the activities of the National Bureau of Standards (NBS). In addition, the bill authorizes fiscal year 1987 appropriations of $1.7 million for the Office of Productivity, Technology and Innovation (OPTI), and $0.5 million for the National Technical Information Service (NTIS) to carry out patent licensing activities.

Fiscal year 1986 funding to date is $118.7 million for NBS, $2.3 million for OPTI, and $0.5 million for patent licensing activities. These amounts reflect reductions required by the Balanced Budget and Emergency Deficit Control Act of 1985. For fiscal year 1987, the President is requesting $124.0 million for NBS, $1.7 million for OPTI and $0.4 million for patent licensing activities.

5. Estimated cost to the Federal Government:

[By fiscal years, in millions of dollars]

	1987	1988	1989	1990	1991
Authorization level	126.9				
Estimated outlays	97.7	26.7	2.5		

The costs of this bill fall within budget function 370.

BASIS OF ESTIMATE

For the purposes of this estimate, it was assumed that the full amounts authorized in the bill would be appropriated prior to the beginning of fiscal year 1987. The specified authorization level is that cited in the bill. Outlays reflect historical spending patterns for the relevant programs.

6. Estimated cost to State and local governments: None.

7. Estimate comparison: None.

8. Previous CBO estimate: On June 2, 1986, CBO prepared a cost estimate for H.R. 4354, a similar bill ordered reported on May 22, 1986 by the House Committee on Science and Technology. H.R. 4354 specifically authorized 1987 appropriations of $126.9 million for NBS and other programs, $48,000 less than the amounts authorized by S. 2664.

9. Estimate prepared by: Theresa Guilo.

10. Estimate approved by: James L. Blum, Assistant Director for Budget Analysis.

Regulatory Impact Statement

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported.

S. 2664, as reported, authorizes fiscal year 1987 appropriations for the programs of NBS, OPTI, and NTIS. The bill does not regulate private sector activity, and the Committee believes that the bill will not affect the personal privacy of any individual or business and will not require any additional reports or records.

Section-by-Section Analysis

SECTION 1.—SHORT TITLE

The first section states the short title of the bill, the "National Bureau of Standards Authorization Act for Fiscal Year 1987".

SECTION 2.—NATIONAL BUREAU OF STANDARDS AUTHORIZATION

Section 2(a) of the bill authorizes fiscal year 1987 appropriations totaling $124,661,000 for NBS. The administration requested a fiscal year 1987 budget of $123,953,000 for NBS. The following table compares the administration's request to the authorization levels of S. 2664 by budget subactivity:

[In thousands of dollars]

	Request	S. 2664
Measurement research and standards	$39,314	$37,718
Materials science and engineering	22,790	21,882
Engineering measurements and standards	29,185	35,858
Computer science and technology	5,000	9,242
Research support activities	27,664	19,961
Total	123,953	124,661

Measurement research and standards

The primary purpose of this subactivity is to provide physical and chemical standards, reference materials, and data for uniform measurements. NBS is involved in standards of electrical quantities, frequency, mass, pressure, temperature, and time. Standard reference materials are important for quality control in manufacturing and for accuracy in scientific research.

The Committee believes that the authorization level in S. 2664, as reported, is sufficient to continue current services in the Measurement Research and Standards subactivity. The Committee notes that the administration has not proposed any programmatic changes in the subactivity. The authorization level in the bill is intended to accept the administration's $2,193,000 upward adjustment to base, but not to restore the $1,596,000 reduction which was sequestered from the subactivity pursuant to the Balanced Budget and Emergency Deficit Control Act.

Materials science and engineering

This subactivity focuses primarily on the structure and performance of materials. NBS contributes to U.S. technological development by studying the properties of ceramics, polymers, metals, glasses, and composites and by developing measurement methods and standards. NBS's nuclear reactor is an important facility for NBS's materials characterization and is available to researchers from the private sector, academia, and other Federal agencies.

The only programmatic change requested by the administration for the Materials Science and Engineering subactivity is a $783,000 increase for polymer and ceramic science. The purpose of the proposed increase is to develop standards and data necessary to understand the performance of advanced ceramics, which are essential to many high-technology industries. The ability of ceramics to resist high temperature and wear makes ceramics suitable for use in electronic and optical components, and the world market for advanced ceramics is likely to increase exponentially in the near future.

The principal technical problems with advanced ceramics is that tiny microstructural defects can affect product performance significantly. NBS's research is intended to understand, predict, and control the relationships between structure, processing, and performance reliability of advanced ceramics. The Committee is concerned that other nations, notably Japan, dominate the market for advanced ceramics, and the Committee believes that research by NBS will contribute significantly to U.S. competitiveness in current and future ceramics markets. The Committee strongly supports the funding increase for polymer and ceramic science.

The Committee believes that the authorization for Materials Science and Engineering is sufficient to continue other programs within the subactivity at their present levels. The Committee has incorporated into the authorization an $899,000 upward adjustment to base, but has not restored a $908,000 reduction resulting from the Balanced Budget and Emergency Deficit Control Act.

Engineering measurement and standards

The Engineering Measurement and Standards subactivity provides measurement and standards which contribute to the economic growth and technological advancement of the Nation. The subactivity includes electronic and electrical measurements, fire research, building research, manufacturing research and standards, mathematical sciences, and chemical engineering metrology.

The administration's budget request includes proposals to increase funding for electronic and electrical measurements by

$950,000 and to eliminate the Center for Fire Research and Center for Building Technology.

The purpose of the proposed increase in electronic and electrical measurements is to provide measurements for optical fiber components of modern communications systems. NBS's research supports development of lightwave systems which are used to transmit information through optical fibers.

This technology is a significant improvement over copper wire components, and the world market for fiber-optics is growing rapidly. The Committee believes that NBS's work with lightwave systems will contribute to U.S. competitiveness in fiber-optics, and the Committee supports the requested funding increase.

The Center for Fire Research is used to study the physical properties of fire and the dynamics of fire within structures. The Center's research develops data which help predict and reduce fire hazard by supporting development of fire protection materials, standards, and safety evaluation techniques. The Center for Fire Research was created by the Federal Fire Prevention and Control Act of 1974 to work with private sector organizations and other government agencies, with the broad mission of conducting research aimed at reducing the Nation's fire losses.

The administration has proposed to eliminate funding for the Center for Fire Research in fiscal year 1987. The administration argues that research performed at the Center can and should be assumed by the private sector and by State and local governments.

The Committee rejects this proposal for the fourth consecutive year. The Committee does not believe that State and local governments can build comparable facilities and perform comparable research programs. The Committee believes that, if local governments could in fact build similar facilities, the construction of fire research facilities in each State or city would be much more costly to taxpayers than the operation of the Center for Fire Research.

In hearings on NBS's 1987 budget, administration witnesses pointed out that automobile manufacturers finance automotive safety research, and argued that industries that depend on fire research also should fund the research. The Committee responds that the industries that depend upon fire research (the construction industry, manufacturers of furniture, plastics, and clothing) are less centralized than the automobile industry, which consists of a small number of large firms, and therefore could not construct facilities comparable to the Center for Fire Research. Further, fire research is not as profit-oriented as automotive safety research, and the private sector would not undertake the research in the absence of a Federal facility.

Finally, the Committee believes that the administration's arguments do not address the Center's role in providing technical support for standards and safety codes used by the construction industry, fire protection organizations, and Federal agencies. Many Federal standards and methods, including safety criteria for woodburning appliances adopted by the Consumer Product Safety Commission (CPSC) and the new Department of Interior methods for extinguishing fires on offshore oil-drilling platforms, were developed with the technical support of the Center for Fire Research.

The Committee does not accept the argument that this role can be assumed by non-Federal entities.

The Committee is aware that the Center for Fire Research is developing a Hazard Analysis model which will be useful in rating the toxicity of various materials. The Committee directs the Bureau to report to the Committee by October 1, 1986 on the status of this research.

Section 2(b)(1) states that $5,141,000 of the funds authorized for Engineering Measurements and Standards are authorized only for the Center for Fire Research.

The Center for Building Technology performs research to evaluate and predict material and structural performance and to develop test methods and computer models which improve construction methods and reduce damage from structural failures. NBS maximizes the value of the Center's research by working with trade associations, standards organizations, and professional societies to define research needs and to disseminate research results.

The Center provides neutral technical support for many building codes and standards, and analyzes major structural failures, such as the 1981 Hyatt Regency skywalk collapse in Kansas City, MO, and the 1982 highway ramp collapse in East Chicago, IN.

The administration has proposed to eliminate funding for the Center for Building Technology in fiscal year 1987. The administration's argument is similar to its rationale for proposing the elimination of the Center for Fire Research—that State and local governments and the private sector should assume responsibility for the research.

The Committee rejects the administration's proposal for the same reasons that the Committee opposes the elimination of the Center for Fire Research. The Committee finds no evidence that private entities or local governments would assume the programs of the Center for Building Technology, and the Committee believes that the Center provides reimbursable services which could not be made available by non-Federal entities in a cost-effective manner.

Many federal agencies, including the Federal Emergency Management Agency, the National Science Foundation, the Department of Housing and Urban Development, the CPSC, the Environmental Protection Agency, and the Occupational Safety and Health Administration, conduct building-related programs which require both the technical support and the facilities of the Center for Building Technology. Funding for reimbursable work by other agencies at the Center exceeds the level of appropriations. The Committee cannot envision a scenario in which these services could be provided at less cost to the taxpayers.

The Center's work on seismic design and construction is mandated by the Earthquake Hazards Reduction Act of 1977. The Committee has not been informed of the administration's plan to meet these responsibilities in the absence of funding for the Center for Building Technology.

Section 2(b)(1) specifies that $3,100,000 of the funds authorized for Engineering Measurements and Standards are authorized only for the Center for Building Technology.

S. 2664, as reported, authorizes $35,858,000 for Engineering Measurements and Standards. This authorization is intended to re-

store funding for the fire and building levels to their 1987 base levels and to increase funding for electronic and electrical measurements by $950,000. The authorization is not intended to restore a reduction of $1,568,000 from the 1986 appropriation which was made pursuant to the Balanced Budget and Emergency Deficit Control Act.

Computer science and technology

NBS's Institute for Computer Sciences and Technology provides technical support to Federal agencies, State and local governments, and the private sector in the development of computer standards and networks. The Institute's standards and guidelines contribute to the efficiency of Federal and private computer software and to the protection of computer systems and networks from unauthorized access.

The administration has proposed to reduce funding for NBS's computer work from the 1986 appropriated level of $9,657,000 to $5 million. The administration argues that the private sector has assumed NBS's role in computer networking through formation of the Corporation for Open Systems, which is a private, non-profit group which formed to build upon NBS's work in the Open Systems Interconnection project. The administration believes that NBS should focus upon the automated data procesing needs of Federal agencies, and that the Corporation for Open Systems has obviated the need for NBS to work with the private sector.

S. 2664 restores funding for computer sciences and technology to the 1986 post-Gramm-Hollings level of $9,242,000. The Committee received testimony from Boeing Computer Services, a member of the Corporation for Open Systems, to the effect that, although NBS's work in private computer networking has made possible the formation of the Corporation for Open Systems, the project is not far enough along to proceed without the support of NBS. The Committee supports this view, and believes that NBS should continue to work with the private sector as long as NBS has a role which has not been assumed by the private sector and is of significant value to the U.S. computer industry.

Research support activities

This subactivity includes several activities which provide support to all NBS programs. The purpose of research support activities is to ensure that NBS has the knowledge, equipment, and capital necessary to meet its original mission and additional legislative directives. The administration has requested several changes in funding for this subactivity, including a $10 million increase to begin development of a Cold Neutron Research Facility at NBS, an increase in funding for scientific computing support, and reductions to NBS's Technical Competence Program and Research Associate Program.

The $10 million request for the Cold Neutron Research Facility is the largest single item in the administration's budget submission. The facility would create research opportunities for materials such as ceramics, polymers, and metals. Improved understanding of the properties and processes of these materials would contribute to quality control and structural design of many components used in electronics, communications, and engineering. Many of the facili-

ty's applications would benefit industry; the admininstration argues, however, that private entities could not provide the capital investment necessary to develop a cold neutron facility.

The administration requested funding for the Cold Neutron Research Facility for fiscal year 1986. The response of the Committee and the Congress was that the facility would be beneficial, but that budgetary constraints would not permit development of the facility without offsetting reductions. The Committee believed that the administration's proposal to eliminate the Center for Fire Research and the Center for Building Technology was unacceptable because of the importance of the two Centers and the Committee's believe that their functions could not be assumed by other entities, as discussed above.

Once again, the Committee does not support funding for the Cold Neutron Facility offset by the elimination of the two centers. The Committee communicated this position clearly to the administration during the fiscal year 1986 budget cycle, and the Committee had hoped that the administration would present a proposal which funded the Cold Neutron Research Facility without eliminating the centers. The Committee stresses its willingness to support a NBS budget which, within budgetary constraints, would fund the Cold Neutron Research Facility without significantly reducing the activities of the fire and building centers.

Section 2(b)(2) precludes the use of any Research Support Activities funds for development of the cold neutron facility.

NBS provides scientific computing support, including technical support to improve the operation of the Department of Commerce's supercomputer system, known as the Department of Commerce Consolidated Scientific Computer System. The President has requested an increase of $550,000 in funding for NBS's scientific computing support. The Committee supports this increase, which will help the Department utilize the capabilities of its supercomputer system.

The Technical Competence Fund was established to fund projects which NBS considers to have potential long-range benefit and to be consistent with its mission. The NBS undertakes pilot projects with the competence fund and evaluates the prospective direction and scope of future projects in given fields.

The administration has proposed to reduce the Technical Competence Fund from $9 million to $7,500,000 in fiscal year 1987. The Committee believes that the Competence Fund is an important source of new projects for NBS and the Committee opposes the proposed reduction. The authorization level in S. 2664 assumes that the Technical Competence Fund will be funded at $8,600,000 which is the 1986 level after reductions pursuant to the Balanced Budget and Emergency Deficit Control Act.

NBS's Research Association Program enables NBS to attract many scientists and engineers and to improve the transfer of NBS's accomplishments to the national scientific community. The program includes Industrial Research Associates, Postdoctoral Research Associates, and the Graduate Cooperative Education program. Each of these programs involves the recruitment of qualified scientists and engineers to work with NBS staff. The Industrial Re-

search Program is funded by organizations which employ the associates, and the others are supported by appropriated funds.

The administration has proposed to reduce funding for the Postdoctoral Research Associates Program from $2,500,000 to $900,000. The Committee understands that this reduction would prevent NBS from taking its usual 22 postdoctoral associates in 1987. The Committee opposes this reduction and has authorized sufficient funds to restore the reduction, but the Committee is concerned that funding may not be available in time for NBS to proceed with recruitment of postdoctoral associates. The Committee directs NBS to report to the Committee on NBS's ability to recruit postdoctoral associates if the appropriations process is not completed before September 1, 1986.

S. 2664 authorizes $19,961,000 for research support activities. This Committee reached this figure by adding a $629,000 adjustment to base for the subactivity and the requested $550,000 increase for scientific support to the 1986 post-Gramm-Rudman-Hollings level of $18,782,000.

SECTION 3.—OFFICE OF PRODUCTIVITY, TECHNOLOGY, AND INNOVATION

Section 3 authorizes fiscal year 1987 appropriations for OPTI.

The purpose of OPTI is to stimulate technological growth and productivity in the private sector. OPTI coordinates Federal technology transfer programs, conversion to the metric system, Federal patent policy, and implementation of the Stevenson-Wydler Technology Innovation Act of 1980.

The administration has requested an appropriation of $1,510,000 for OPTI for fiscal year 1987. The administration believes that OPTI has completed its mission and the administration proposes to phase out OPTI during fiscal year 1987.

Section 3 of S. 2664 authorizes $1,727,000 for OPTI, which is the fiscal year 1986 funding level after reductions pursuant to the Balanced Budget and Emergency Deficit Control Act. The Committee opposes the elimination of OPTI because the Committee oversees implementation of the Stevenson-Wydler Act and other related Acts of Congress. The Committee believes that a phase-out of OPTI would leave provisions of Federal law unfulfilled. OPTI, for example, serves as the Office of Industrial Technology which the Stevenson-Wydler Act directs the Secretary of Commerce to establish. The Committee is unware of any administration plans to carry out this requirement in the absence of OPTI.

The Committee supports continued funding of OPTI at the fiscal year 1986 level.

SECTION 4.—NATIONAL TECHNICAL INFORMATION SERVICE

Section 4 authorizes $500,000 for the patent licensing activities of NTIS. The administration requested $443,000 for NTIS. The fiscal year 1986 budget for NTIS' patent licensing activities is $536,000.

NTIS also is the source of Federal scientific and technical documents, but this role is self-sustaining and does not require appropriations.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, the Committee states that the bill as reported would make no changes to existing law.

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